COAL MINING

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November, 1960

Volume 37, No. 11

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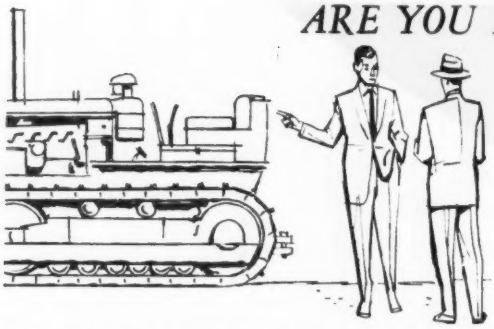

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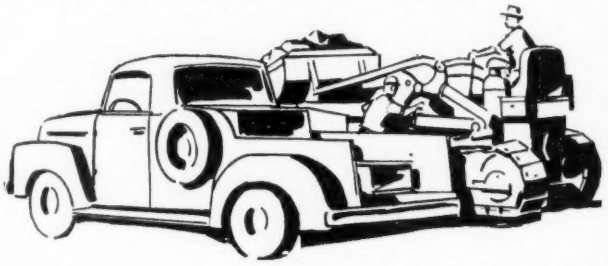

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COAL MINING

Vol. XXXVII November, 1960 No. 11

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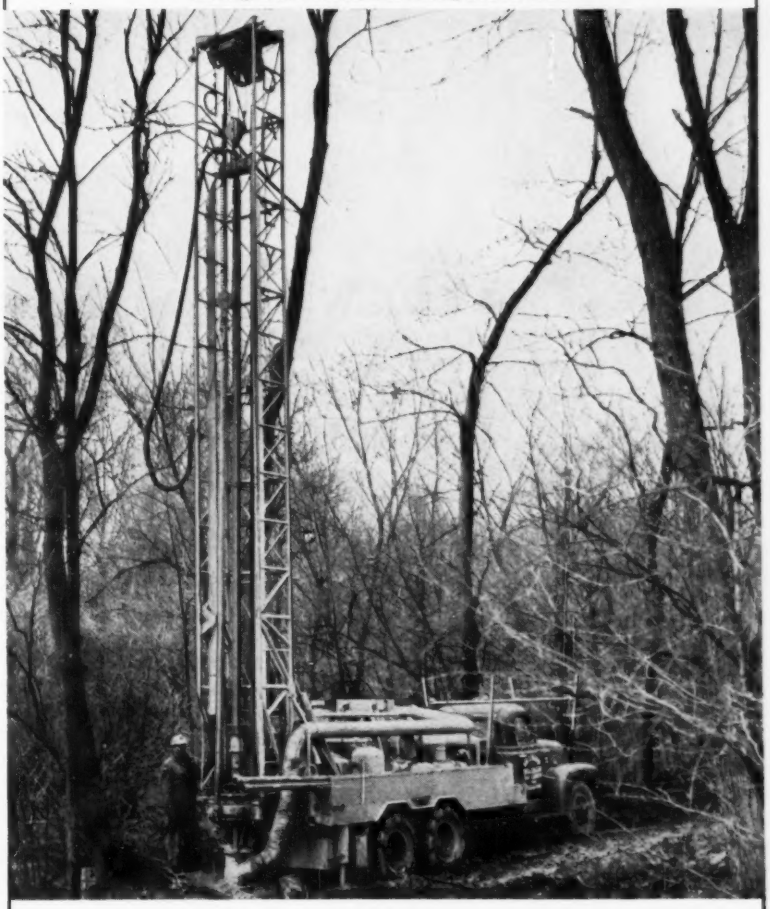
Davey Model M-7SA Rotary Drill coal testing for Harbaugh Coal Co., Madison, Pa. Working in the woods, it is drilling 300 ft. holes.



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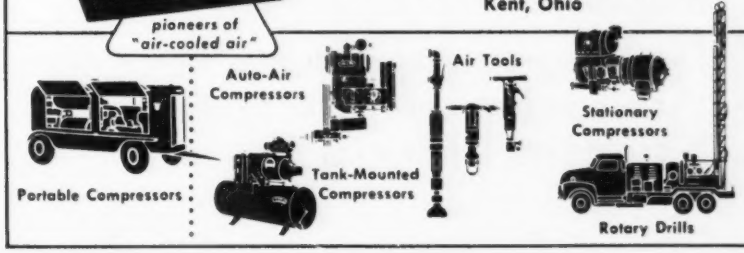

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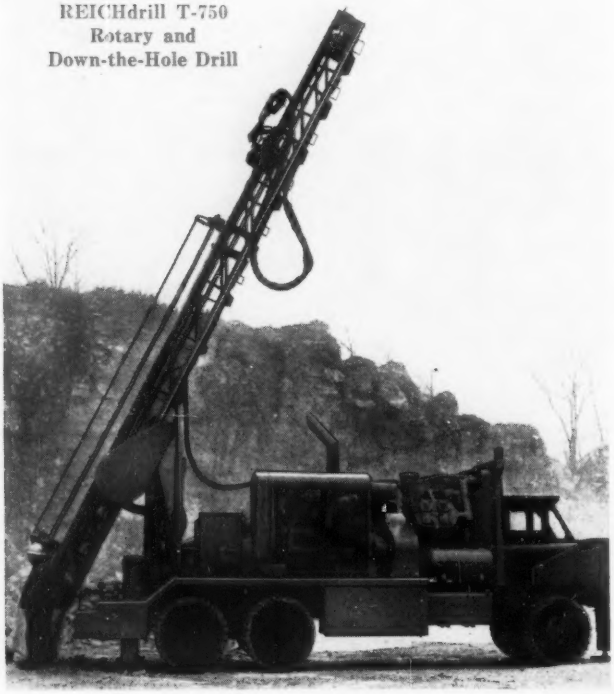

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Now, with the Model SC AIRSLIDE you get hopper capacities from *1000 to 4000 pounds of rock dust* . . . an increase of 25 times.

AIRSLIDE METHOD MAKES IT POSSIBLE

The AIRSLIDE method fluidizes rock dust so that it flows almost like water. A heavy belting, with uniform porosity, located in the bottom of the hopper, introduces low pressure air into the rock dust. This fluidizes the dust and makes the flow uniform and constant, even if the dust is damp. The steeply angled hopper is unnecessary. In fact, the rock dust will even flow down a 6° slope.

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In addition to greater capacity, the discharge rate of the AIRSLIDE has been increased six times, to 600 pounds per minute. Large capacity and high discharge rate permit the volume dusting needed to keep pace with rapid advance work. AIRSLIDE uniformly covers ribs, roof and bottom in one operation, using one man. Cuts your dusting costs . . . noticeably.

For additional information call your MSA Representative. Or write, Mine Safety Appliances Company, Pittsburgh 8, Pa. In Canada: Mine Safety Appliances Company of Canada, Ltd., Toronto 4, Ontario.

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Do You Know?

● The fastest and most advanced computer system in operation anywhere, the UNIVAC LARC, is now working at the University of California's Lawrence Radiation Laboratory in Livermore, Calif.

The huge solid-state digital computer will be used in a variety of Atomic Energy Commission-supported research projects to solve problems of almost unbelievable complexity, problems that were unapproachable with existing computer systems.

Acquisition of the LARC will provide scientists with a valuable new tool in their attack upon problems in nuclear science and technology which are of vital importance to the nations defense, Dr. Harold Brown, director, explained.

Many times faster than existing computer systems, the LARC was designed and built by Remington Rand UNIVAC with funds from the AEC. The Livermore laboratory is operated by the University of California for the AEC.

● There seems to be one big problem the giant electronic "brains" cannot solve for themselves: how to talk with one another. But their builders, the big electronic and automation corporations, appear ready to standardize the brains' language or in some other manner let the brains work and talk together.

By making the brains compatible, the companies hope to make automation cheaper.

The problem: one company's brain thinks differently from another's. They use different systems of calculation.

Thus, if a company has a lot of International Business Machines Corporation equipment, it cannot readily buy and use Sperry- Rand improvements, or vice-versa.

And if one government agency with one kind of equipment seeks to use data from another agency with a competing kind of equipment, the conversion may be tough or downright impossible.

This kind of inefficiency is expensive. If the machines can be standardized, the result will be a saving of millions of dollars annually by customers, Alfred J. Ball, president of the Office Equipment Manufactureres Institute here, believes.

Dr. Joseph W. Barker, consultant in New York to OEMI's new X-3 commitee on data processing standardization, said in an interview here that the standardization will lower the cost of automation. But he said standardization had pitfalls.

"We must standardize without blocking technological development."

Twenty-four manufacturers of automation equipment are cooperating in the standardization venture.

Some of these companies' machines can work with each other now, via translating devices called transverters. Dr. Barker feels that improved and standardized transverters may turn out to be the fullest solution possible.

But ultimately, Dr. Barker hopes, standardization will permit data processing machines made by ifferent companies to be hooked up and worked in concert via telephone lines.

HERE AND THERE IN THE COAL INDUSTRY

● Six national engineering societies have agreed to sponsor special sessions on power and fuels at the 23rd annual American Power Conference to be held in Chicago, March 21-23, at the Sherman Hotel.

They are American Society of Mechanical Engineers, Western Society of Engineers, National Association of Power Engineers, American Institute of Electrical Engineers, American Society of Civil Engineers, and the American Society of Heating, Refrigeration, and Air Conditioning Engineers.

Conference director R. A. Budenholzer of Illinois Institute of Technology announced that the conference also will include sessions on the operation of supercritical central station power plants, and new developments in the field of nuclear power generation.

The conference is sponsored by Illinois Tech; nine cooperating universities, Iowa State, Michigan State, Northwestern, Purdue, University of Iowa, University of Illinois, University of Michigan, University of Minnesota and University of Wisconsin; five regional universities, Texas A & M, California Institute of Technology, Georgia Institute of Technology, Massachusetts Institute of Technology, New York University; and nine cooperating societies, American Institute of Chemical Engineers, American Institute of Mining, Met. and Pet. Engineers, Engineers' Society of Milwaukee and the six mentioned above.

● The Coal, Coke and Iron Ore Committee-Trunk Line Territory Railroads has docketed a proposal to establish a reduced rate of $5.88 per net ton on bituminous coal, carloads, from the Clearfield District, with usual differentials from related origin regions, to Boston and Maine Railroad Stations at Bradford, North Andover, Lawrence, Andover, Ballardvale, Lowell Junction, Tewksbury and Lowell, Mass. The reduced rate is subject to Ex Parte 223 increases.

● Peabody Coal Co., St. Louis, says its new Sunnyhill Mine No. 9 in Ohio will be completed next month, with a capacity of two million tons a year. It will replace the production from Sunnyhill No. 8, which will be closed. The new mine will have a new preparation plant with a fluid bed thermal drying system. Peabody also says a new 65-yard stripping shovel is expected to be in operation next month at its Bevier Mine near Macon, Mo.

● The Operators' Association of the Williamson Field held its Forty-Sixth Annual Membership Meeting Oct. 20 at Williamson, W. Va. Officers unanimously elected for 1961 are: President, L. E. Woods, president, Crystal Block Coal & Coke Co.; vice president, E. M. Bane, president, D. J. B. Collieries, Inc.; treasurer, L. E. Tierney, Jr., president, Eastern Coal Corp.; and executive secretary, Joseph J. Ardigo.

Powerful International TD-25 strips overburden for Croner, Inc. of Berlin, Penna. Some 12 feet of overburden will be removed in a cut 60 feet wide to uncover a 16 inch seam. • Planetary steering, a unique feature of the TD-25 allows the operator to maintain a full load on the blade at all times, even on turns. • Contact your State office for full details on this great new tractor. Let us demonstrate how you can reduce your stripping costs.

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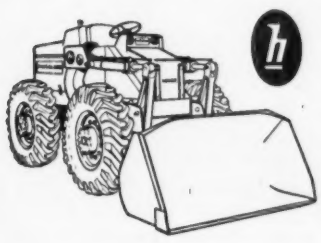

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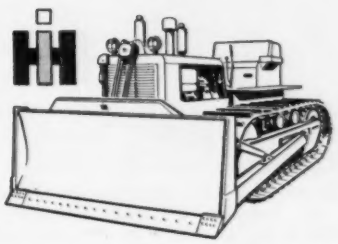
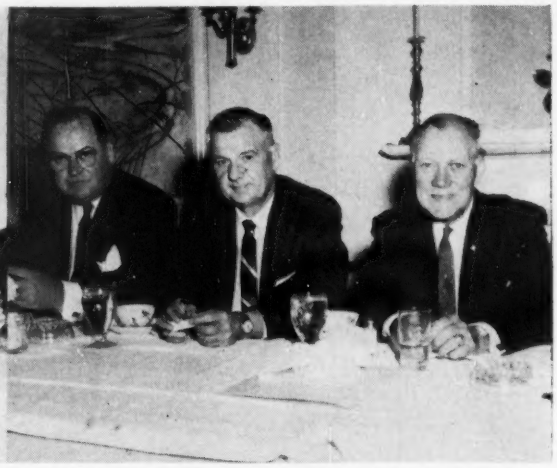


Left: Frank Smith, General Council for the Assoc., Harry Cook, Exec. V-Pres. of the Ohio Reclamation Assn., Harry Gandy, Jr., National Coal Assn., T. M. McCarthy, Clearfield Bituminous Coal Corp.

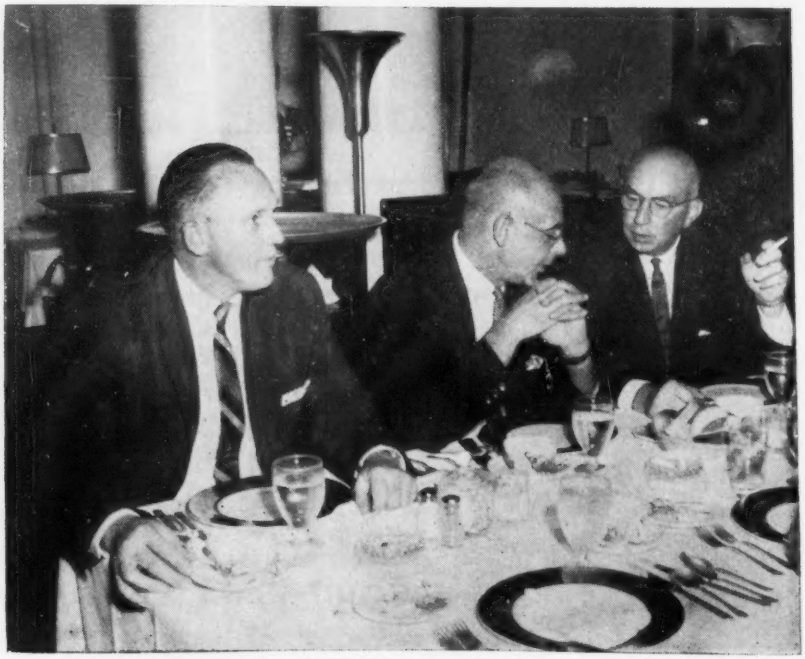


Left: Joseph E. Moody, Pres. National Coal Policy Conference, Inc., R. T. Todhunter, Jr., Pres., Barnes & Tucker Company, R. T. Laing Secretary of the Assn.

Annual Meeting Of The Central Pennsylvania Coal Operators Association

● The Annual meeting of the Central Pennsylvania Coal Producers Association was held at the Bedford Springs Hotel, Bedford, Penna. September 26 and 27. At the sessions held, papers were presented by Harry C. Ballman, Manager of Air Pollution Control Division of National Coal Association, on recent air pollution legislation, both national and state, and how it affects the coal industry; L. S. Morgan, Chief of the Mine Drainage Section of Pennsylvania Department of Health, will speak on mine drainage problems with particular emphasis on acid mine waters; and Larry Cook, Vice President of Ohio Reclamation Association and Chairman of Coal Advisory Committee to ORSANCO, on acid mine water and

Royce A. Hardy, Assistant Secretary of the Interior (Mineral Resources) Washington, D. C., was the principal speaker at the Banquet.

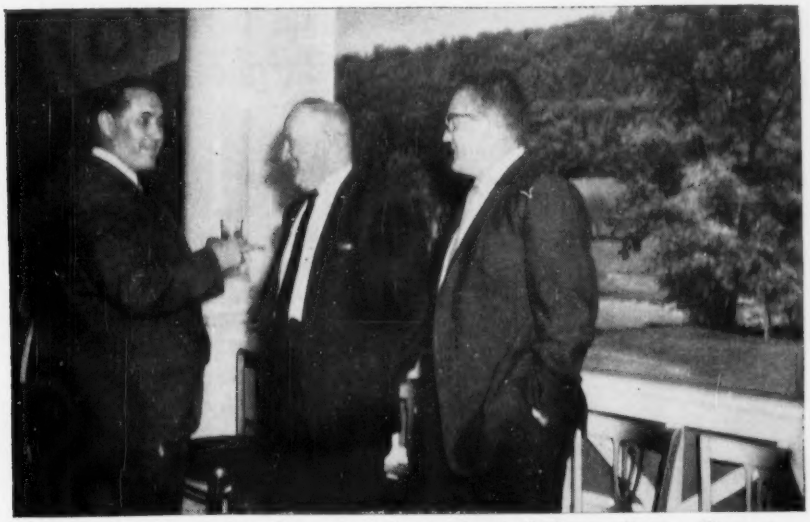


Left: J. D. Sutton, Clearfield Bituminous Coal Corp., W. M. Ziegler, Purchasing Agent, Clearfield Bituminous Coal Corp., Homer Chalfont, Manager Mines, Bethlehem Mines Corp.

Left: George E. Owen, Chairman of Board, Imperial Coal Company, Heath S. Clark, the incoming president of the Associations, Ed Fox, Bituminous Coal Operators Assn.

Left: T. Reed Scollon, Chief Div. of Bituminous Coal, U. S. Bureau of Mines, W. Roy Cunningham, Deputy Secretary, Penna. Dept. of Mines, W. F. Hahman, Coordinator for Fuel O. M. M. Dept. of Interior. C. J. Dalzell, Sub. District Supervisor U. S. Bureau of Mines, Washington, D. C.

Left: Sam Light, President, Lindsey Coal Co., P. L. Stewart, Ringgold Coal Company, J. S. Screcengost, Chief Engineer, Allegheny River Mining Co.



Left: Joe E. Smith, Simpson Coal & Chemical Corp., George Trevorrow, Bituminous Coal Operators Assn., John Todhunter, Barnes & Tucker Company.

its problems in connection with the Ohio River Valley.

Heath S. Clark of Indiana, Pennsylvania, of Rochester and Pittsburgh Coal Company, was elected President of The Central Pennsylvania Coal Producers' Association and Eastern Bituminous Coal Association. He was elected to head both groups at the Annual Meeting of the Associations held at Bedford Springs Hotel, Bedford, Pa., on Monday, September 26th. Other officers are:

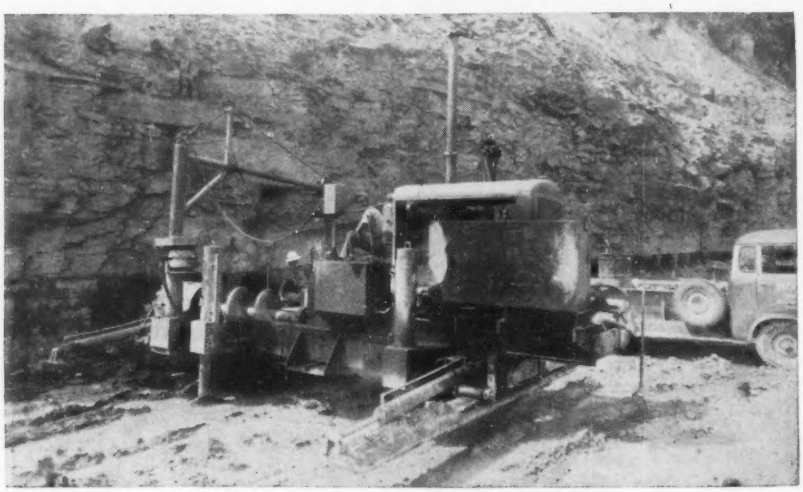
R. H. Seese, Windber, R. T. Todhunter, Jr., Barnesboro, Vice Presidents; Robert T. Laing, of State College, Secretary and Treasurer; C. P. O'Neill, of Altoona, Assistant Treasurer; Frank G. Smith, of Clearfield, General Counsel.

The business meetings of the Associations were held in the morning and afternoon. Prior to the banquet in the evening, a reception was held for members and guests. Following the general meeting in the afternoon, talks of particular importance to the operators in this area were given by Harry C. Ballman of Washington, D. C., Manager of Air Pollution Control Division of National Coal Association; by L. S. Morgan of Greensburg, Pa., Chief of the Mine Drainage Section of the Pennsylvania Department of Health; and by Larry Cook of Columbus, Ohio, Vice President of Ohio Reclamation Association.

(Continued on Page 22)

Looking at the operation from the pit. Coal loading shovel is working in the left corner. The stripping dragline is in upper right corner.

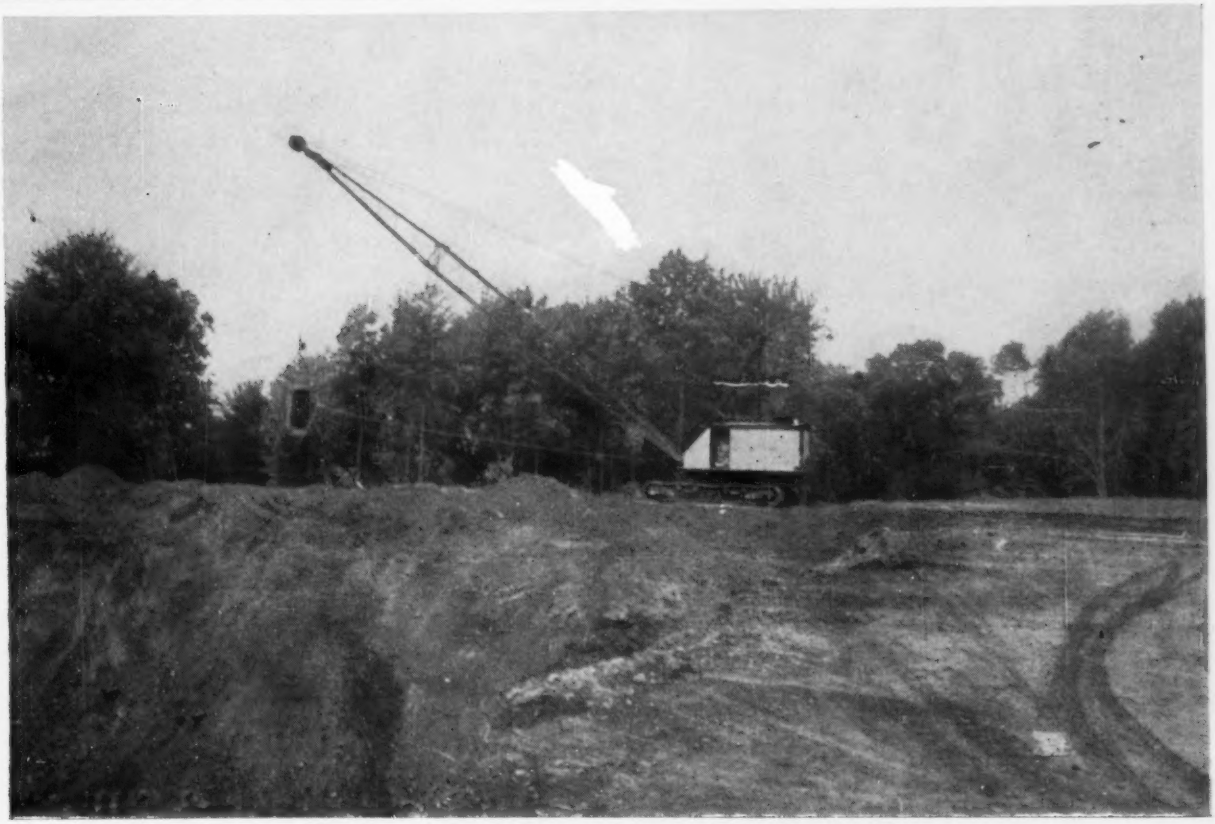
Looking at the stripping dragline from spoil bank.



McCarthy Auger working in highwall.

McClain Coal Company Strips and Augers at Bergholz, Ohio

● Operating in the Ohio Number Five seam of coal averaging 34 inches thick, the McClain Coal Company is using a new Bucyrus-Erie Model 88-B dragline having 90 foot boom and 5 yard bucket for stripping overburden. A McCarthy Auger working in the highwall with a three man crew is averaging 250 tons per ten hour shift.



The Bucyrus-Erie 54-B dragline working in the Northern Pit.

Proper Planning and Use of Modern Equipment Succeed at Testa Coal Company

● The Sandy Lake, Pennsylvania area, lying on the borders of Venango and Mercer Counties, marks the northernmost known coal deposit in Northwestern Pennsylvania. The seam of coal there is known as the Clarion coal. It averages 30 inches thick and is a high quality steam coal in the raw. Overburden is yellow shale which turns gray as it increases in height.

The area has been highly eroded and by far the largest portion of the seam of coal has been washed away. The coal that remains lies above the valleys, allowing overburden from the first strip cut to be spoiled below the coal. Stripping was carried out there by a previous operator who failed for lack of market. Taking over the property, the Testa Coal Company put in a railroad sid-

W. O. TESTA, operator of the Testa Coal Company.

The New Manitowoc VICON dragline stripping in the Southern Pit.

ing, used economical stripping equipment and created a market.

The coal seam rises to the North and at present two pits are being worked. At the Northern Pit, where the overburden is lower and easier to move, stripping is done with a Bucyrus-Erie Model 54-B Dragline having 85 foot boom and 3 yard bucket. Coal is loaded out with a Lorain shovel. At the Southern Pit, where overburden is higher and tougher, stripping is done with a new Manitowoc "Vicon" dragline having 120 foot boom and 7¾ yard bucket. The coal is loaded out by another Lorain shovel. The market found is industry in the Cleveland, Ohio area.

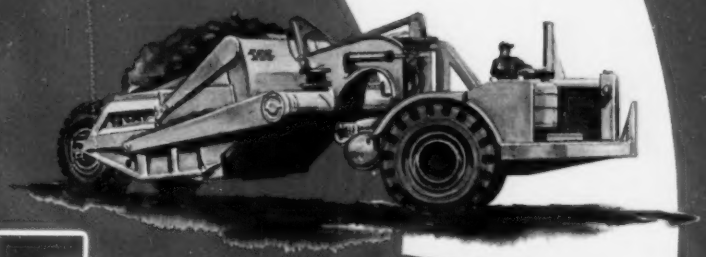
Stripped coal in the Southern pit, showing D-8 tractor cleaning surface of coal and the Lorain loading shovel.

● Construction will start early next month on a multi-million dollar coal cleaning and preparation plant at Eastern Gas & Fuel Associates' Federal No. 1 mine at Grant Town, near Fairmont.

Contract for building the new plant has been awarded to Roberts & Schaeffer Company of Chicago, a division of the Thompson-Starrett Company. The new plant is scheduled for completion in December, 1961. It will have a capacity for processing 12,500 tons of coal per day.

Normal operations will continue at the mine throughout the construction period through use of present coal handling facilities. Existing facilities will be removed when the new plant is ready for operation.

Recent developments
in Cat earthmovers
prove—



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big power-matched

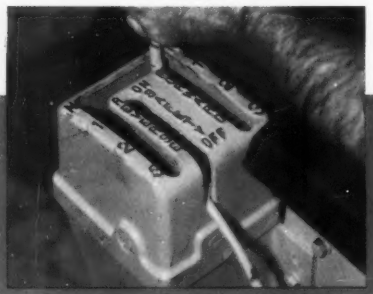
D9
DW20
DW21

big power-matched CATERPILLAR EQUIPMENT

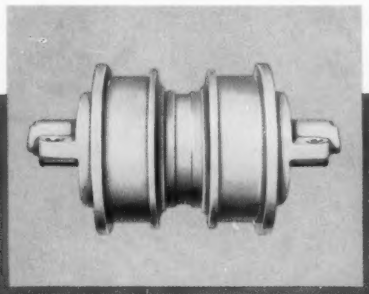
POWER-MATCHED Caterpillar design gives you big capacity machines with the right power for fast loading, fast hauling, most economical earth-moving. And Caterpillar's program of continuous improvement keeps these big D9s, DW20s and DW21s far ahead of the field in productivity, economy and dependability. Look at these recent developments that cut your cycle time, increase your profits.

Cat D9 Series E Tractor provides big push power, easy operation, dependability to cut cycle time, boost production. Yesterday's D9 ushered in many dramatic design advances: first with turbocharger . . . first in size and power . . . first in pushing, dozing, pulling capacity. And thousands of these veteran D9s are still at work today.

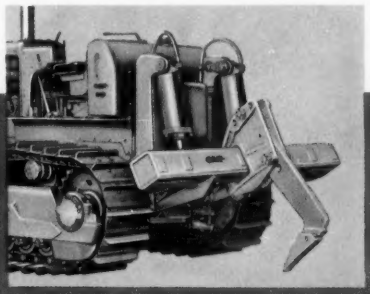
But big things have happened over the past 6 years to put the D9E even further ahead. Recent developments include 335 flywheel HP Cat Diesel Engine, almost 50 HP more than the first D9s; strongest undercarriage ever built, with components lasting up to 40% longer; hydraulic bulldozers with fast acting, new hydraulic controls for greater versatility and production.



TIMESAVER: **Power Shift Transmission**—permits split-second, one hand shifting on the go, under full load. Boosts D9 production 25%—often more.

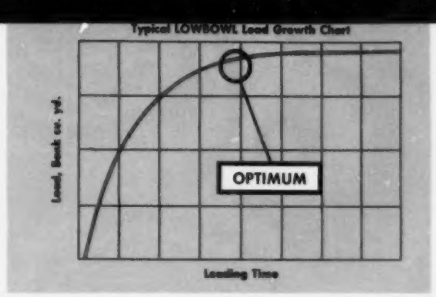


TIMESAVER: **Lifetime Lubricated Rollers and Idlers**—require no servicing until rebuilding. Patented floating ring seals keep lubricant in—dirt out.

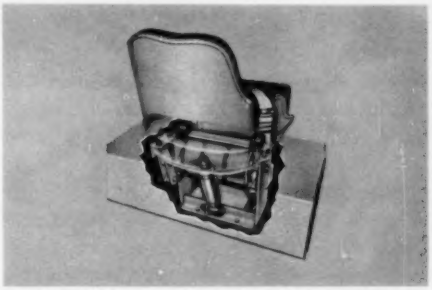


TIMESAVER: **Mounted Ripper**—permits scraper loading for great savings in time and costs in materials formerly handled by blasting.

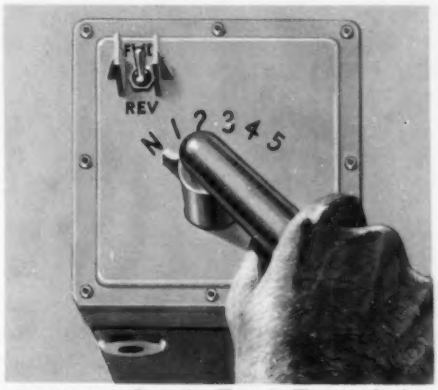
SAVES TIME



TIMESAVER: Lowbowl Scrapers—pioneered by Caterpillar, are much more than a longer, lower, wider bowl. Every component from cutting edge to push block is engineered to load material faster, easier—to save time and money.



TIMESAVER: Torsionflex Seat—gives the operator comfortable, safe rides at high speeds, helps get maximum productivity from his machine. It cushions shocks, reduces operator fatigue.

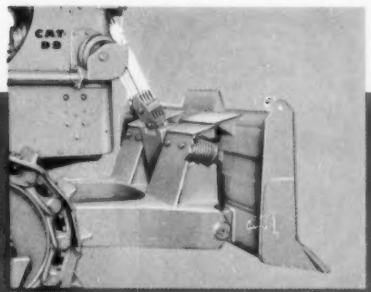


TIMESAVER: SynchroTouch Transmission Control—optional for DW20s and DW21s, makes shifting easy and fast. Operator simply dials the desired gear for automatic, split-second response. Standard foot clutch used only to start from a standstill, prevents accidental starting.

Cat DW20-DW21 Series G wheel Tractors with matched Lowbowl Scrapers pay off with faster cycles, more economical production. Series G units develop 345 HP (maximum output). Both tractors have 12% more rimpull for better grade-ability, higher speeds—up to 35.8 MPH for the DW20G, up to 22.6 MPH for the DW21G.

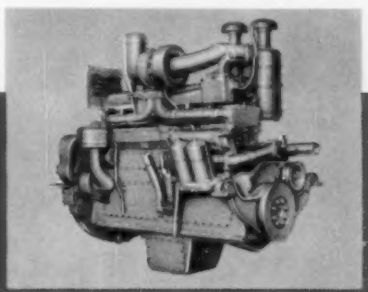
Cat Lowbowl 456B and 470B Scrapers match this increased power. Capacities are greater—19.5 cu. yd. struck, 27 cu. yd. heaped. Also available for the DW20G is the 24 cu. yd. struck, 34 cu. yd. heaped 482B.

Let us demonstrate what these improvements mean to you in faster cycles, more profits!

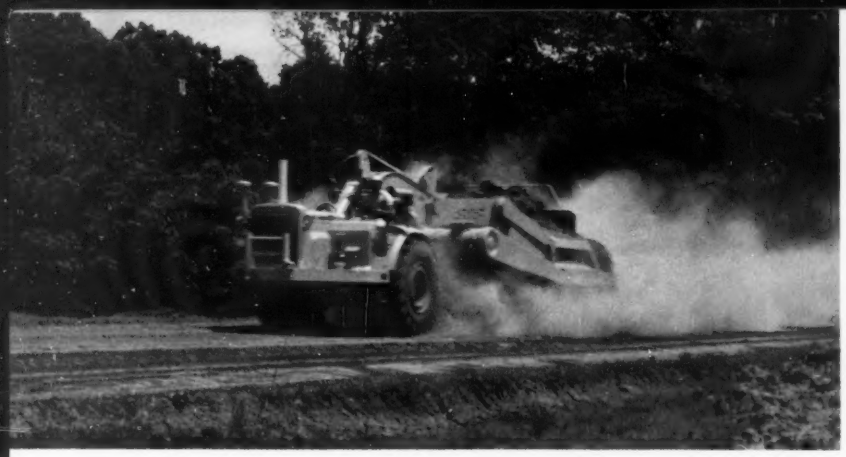


TIMESAVER: 9C Cushion Bulldozer for shock-free scraper contact at relative speeds up to 3 MPH. Cushion Push Block available for tandem work.

TIMESAVER: Dry-type Air Cleaners—eliminate more than 99.8% of all dirt from intake air. Can be serviced in less than 5 minutes.



TIMESAVER: Turbocharged Engines—first introduced in earthmovers by Caterpillar—develop big power, burn economy fuels without fouling.



Project: Shopping Center, Tukwila, Washington*

Job Conditions:

Material: Damp Clay; 3,425 lb. bank cu. yd.

Haul: 1,300 ft. (one way). Soft road. All machines pushloaded by Cat D9 Tractor

Data:	Cat DW21C	New Cat DW21G	Machine X
Ave. Load (bank yd.)	17.5	20.0	23.9
Trips/hr.	10.0	11.3	10.0
Ave. Hourly Prod. (100% efficiency)	**175**	**226**	**239**
Owning & Operating Costs**	$18.87	$20.37	$31.84
Haul Cost/yd.	**10.8¢**	**9¢**	**13.3¢**

2,000 Working Hours

	Cat DW21G 90% Availability	Machine X 85% Availability
Production (bank yd.)	**406,800**	**406,300**
Owning & Operating Costs**	$40.640.00	$63,680.00
Haul Cost/yd.	**10¢**	**15.7¢**

Fleets of Equal Initial Investment in 2,000 Working Hours

Production (bank yd.)	1,220,400	812,600
Production Advantage	**407,800**	
Owning & Operating	$121,920.00	$127,360.00
Cost Advantage	**$5,440.00**	

*Owner's name provided on request.
**All machine costs computed by same method.

Caterpillar's advanced design earthmovers can mean more yards moved, more profits for you. Look at the results of a typical comparison of the new DW21 Series G equipped with Synchro-Touch Transmission Control and an older DW21C; and the new DW21 Series G and a larger rated Machine X. Improvements in the DW21G become readily apparent in increased production, less cost per yard than with the former model. But look at the DW21G's advantages over Machine X. Test data shows the smaller DW21G hauled nearly as many yards per hour (5.7% less) but at 47.8% less cost per yard. And the other machine requires 47% greater initial investment. You can pay as much for only *two* of these other machines as for *three* DW21Gs.

Superiority of the DW21Gs has become evident already, but this assumes equal availability of both machines. Field reports show quality-built Caterpillar machines stay on the job longer. Assume 90% availability for the DW21Gs (many owners report more) and only 5% less for the other machine. See what this means over the months for fleets representing equal initial investments. In just 2,000 working hours, long before your DW21Gs need major repairs, your choice of Cat machines would net you 407,800 more yards moved for $5,440.00 less hauling costs—a bonus of more production than with one of the other machines plus an overall 57% less cost per yard.

CYCLE CUTTING HEADQUARTERS / CATERPILLAR

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2807 Reynolds Road, Toledo, Ohio
U.S. Route 250, Cadiz, Ohio
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CM-11

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Send literature on the following:

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C. E. Flora

Are Oil-Cooled Rotary Compressors Suitable for Mine Use?

by **C. E. Flora**
Industrial Manager, Davey Compressor Company

Compressed air plays an important role today in virtually every mine operation.

Portable and skid mounted units, truck-mounted compressors, as well as stationary machines, are widely employed in stripping. Also, air compressors are vital parts of modern rotary drill assemblies used in increasingly great numbers to speed drilling on large strip jobs.

In deep mine work, several types of air compressors are commonly employed. Frequently stationary units are surface located with air piped into mines. In other cases, air is distributed from large, centralized underground compressor installations. Also, many mines employ mine car compressors built to strictest dimensional specifications.

Because of this widespread use of air, practically every mine operator is vitally interested in compressors. This is particularly true because of present availability of a large number of different mechanical designs —both piston and rotary types. Each, naturally, claims important operating advantages.

Purpose of this article is to describe one of these designs—**the rotary, sliding vane, positive displacement, oil-cooled type**—and to evaluate its adaptability to mine work. Often called "the most modern compressor," this design in unitized form was developed by Davey Compressor Co. and is known as the Davey Hydrovane Rotary.

In the modern oil-cooled rotary, cooling is accomplished by continuous flow of oil through internal parts and its intermixing with air being compressed. Oil is then separated from air. (Method of separation is described later in this article.)

History and Background

Early oil-cooled rotary designs employed an old and tested principle to produce 100 p.s.i. efficiently; namely, one of 2 rotor, 2 step compression machines. However, in the rotary units it was not necessary to insert an intercooler between steps for satisfactory operation. In fact, the old 2 step design was followed only because manufacturers were unable to obtain satisfactory sealing with the limited number of blades (cells) that could be used in a single rotor unit. (Pressure differential across the blades, between cells, was so great as to cause excessive leakage back to the following cells.)

However, later techniques have proved that single step compression in a single rotor oil-cooled compressor can be accomplished with greater efficiency than that attained with 2 step, 2 rotor compression. The Davey Hydrovane is built around this single rotor design. It is, however, thermodynamically a multi-stage (or essentially an isothermal) unit as it removes heat continuously during the entire compression cycle.

Obviously, elimination of one rotor and its huge collection of accompanying mechanical accessories results in tremendous weight reductions. This also makes possible smaller overall size and a cutting of the number of operating parts by almost 50%, together with elimination of associated parasitic friction losses. On the common sense theory that "fewer working parts mean fewer repairs and greater accessibilty for service," the oil-cooled rotary consistently establishes new records for low operating and maintenance costs.

Why Was the Hydrovane Developed?

To understand the operating principle of the Davey Rotary, it is first necessary to be familiar with reasons for its development.

1. Compressed air users have always preferred rotary units because of (a) freedom from vibration (b) simplicity of operation (c) ease and low cost of maintenance.

2. Prior to introduction of the hydrovane, benefits listed in point 1, were, in the writer's opinion limited to applications where (a) there were no existent space limitations (b) frequent blade replacement could be tolerated (c) oil consumption was of minor importance.

Summing it up briefly, Davey has retained all of the operating advantages of point 1 and has eliminated the "handicaps" listed in 2.

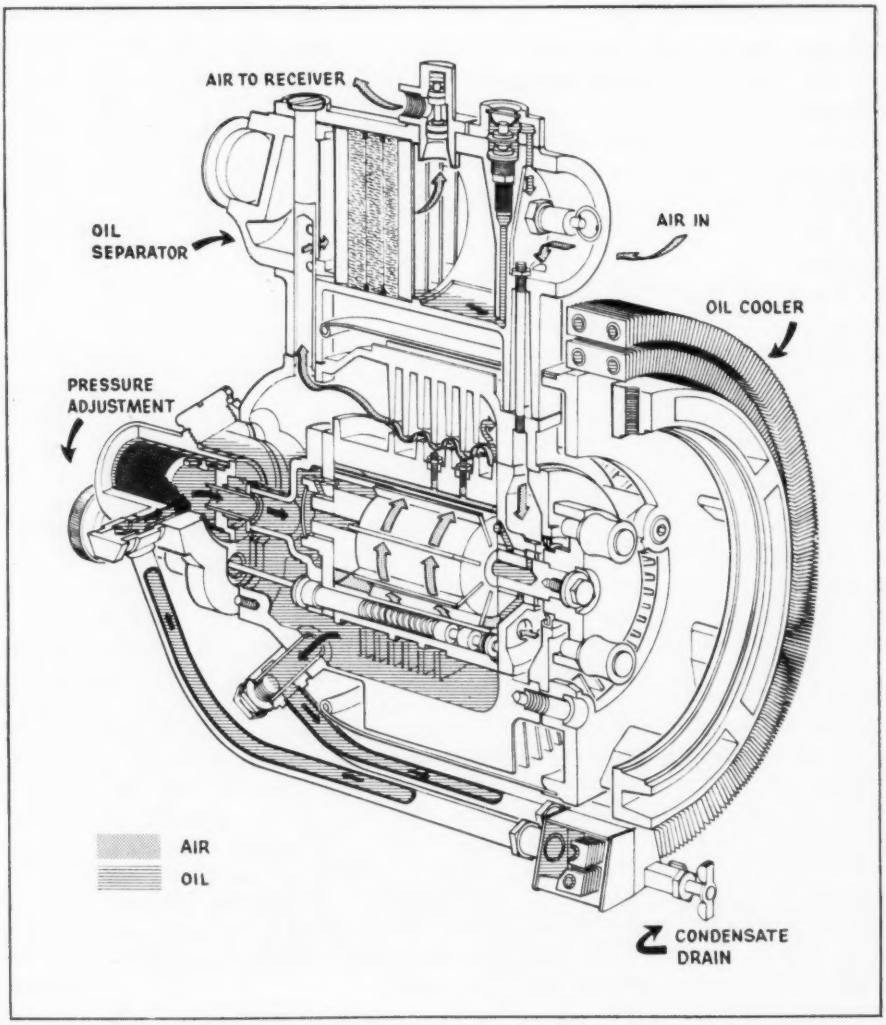
The Davey Design

In the Davey oil-cooled rotary compressor there is a cylindrical rotor, with slots milled radially spaced around the rotor. This is situated in a stator with bore larger than the rotor. An arc, which extends for 60 degrees, is machined in the stator. The rotor rests in this arc, or cutaway. The rotor sits eccentrically in the cutaway of the stator which creates a crescent-shaped compression chamber. Radial blades divide the chamber into several cells and air is pulled into the largest cells and rotated into reducing cells as compression occurs.

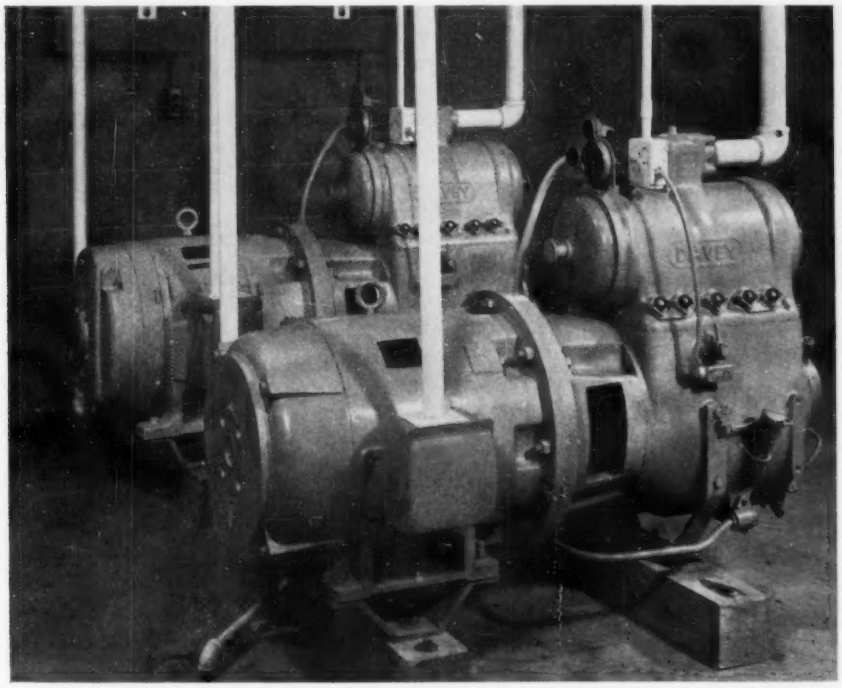
When air pressure reaches design pressure, each cell is connected to discharge ports in the stator which then allow air to escape. In order to prevent escape of air from cells at the blade periphery, oil is injected at various points so that dynamic oil pressure, created by blade movement over stationary surfaces of the end covers and the stator is higher than that of the air. As long as this dynamic oil pressure is higher and the oil wedge exists all around the periphery of the blade, negligible leakage will take place.

The oil wedge at the blade ends is fed with oil from a kidney-shaped groove cut in each end cover. This allows oil to flow radially out between rotor and end cover. It is then picked up by the blade and flows out radially to provide required sealing.

The tip of the blade is fed partly by the end kidneys but mainly from injectors drilled in the stator wall. Positioning of these oil injection points is critical because early injection causes preheating and, if injection is too late, leakage takes place before oil wedges are built up.



Air and oil circuits in Davey rotary air compressors.



2 Davey 40 h.p. rotary compressors, each delivering 166 c.f.m.

A large proportion of the injected oil is in small particles. These are dispersed in the space in the cell. It is these particles that absorb heat developed by air as it is compressed. Sufficent oil exists in this manner to limit air temperature during compression to 180° F under conditions of full load in an ambient temperature of 80° F.

Oil, beside performing the above 2 functions, also provides adequate lubrication of all sliding and rubbing surfaces within the compressor.

Oil Separation

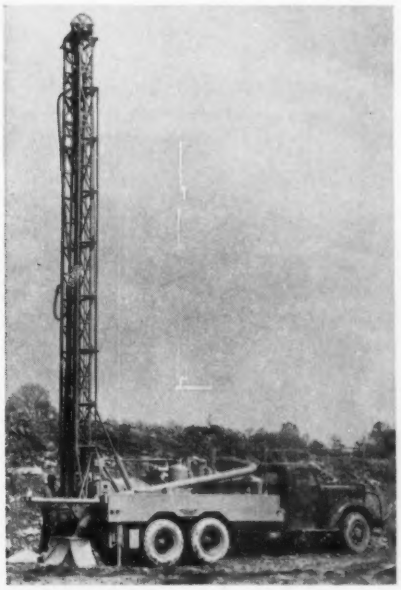
Air, now saturated with oil vapor, compressed to design pressure, is directed to discharge at one end of the rotor-stator cartridge. At this point, the air-oil mixture starts through the labyrinth formed by circumferential internal fins in the oil chamber and external fins on the stator. These fins are staggered to require air in passing through to make many changes in both direction and velocity. Nature of the changes is such that oil, heavier than air, impinges on fins, then runs down to join the body of oil in the lower half of the oil chamber. By the time air reaches the labyrinth end most oil has been removed.

Air, containing fine particles of oil, then travels upward, into the final oil separator assembly. This separator contains an inorganic fibre glass element which accumulates fine particles of oil that drain back to the intake section of the compressor by means of a pressure-reducing, oil return valve.

The result is that oil content in air, coming from the compressor, is approximately 1 ounce in every 28,000 cubic feet. This is equal to, or less than, that present in reciprocating compressors.

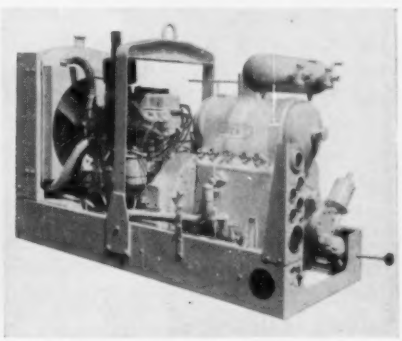
Durable Blades

Development and use by Davey of patented Perma-Vane blades has



Rotary drill for exploration, blast hole and well drilling.

600 c.f.m. portable compressor, trailer type.



Skid-mounted unit for truck or stationary mounting.

brought with it the element of reliability and trouble-free service. This makes the light, compact rotary compressor ideal for coal mining use, either above or under ground.

Since rotor blades are the principal compressor operating and wearing parts, it is of vital importance that they be structurally strong, free from delamination, light and with long surface wearing capacity. Also, that they avoid hot leading edge surfaces.

All of these qualities are obtained with Perma-Vane blades, which are made of a solid mass of magnesium alloy, with a ceramic coating for wear resistance and a final coating of electro-film for smoothness and self lubrication.

Perma-Vane blades are giving amazingly reliable performance. Records are available covering trouble-free operation for many thousands of hours and they are reducing downtime and maintenance expense to a very low factor. (See Coal Mining, January, 1960.)

Compressor Efficiency

True efficiency is the measure of the quantity of air (c. f. m.), delivered by the compressor to an air receiver, against the amount of power consumed to produce it.

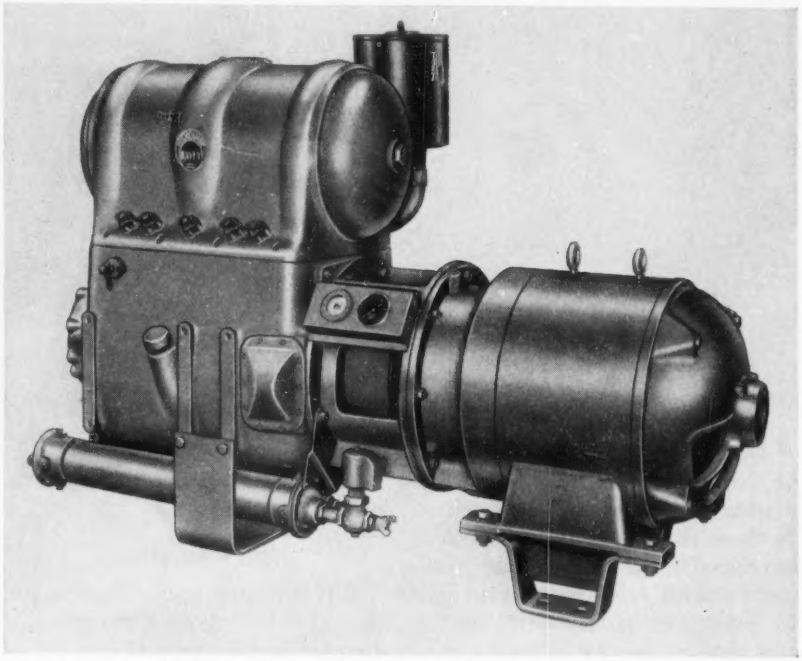
The average Davey oil-cooled rotary maintains a ratio of 4.2 to 4.5 c. f. m. per h. p. throughout its entire operating life. This compares very favorably, in fact is better than most rotary and single-acting reciprocating designs.

We firmly believe that this efficiency, coupled with lower installation costs—no base is required—lower parts and maintenance expense because of fewer working parts; moving ease due to small dimensions and light weight—all constitute features which make rotary, sliding vane, positive displacement oil-cooled compressors worthy of your careful consideration for mine work.

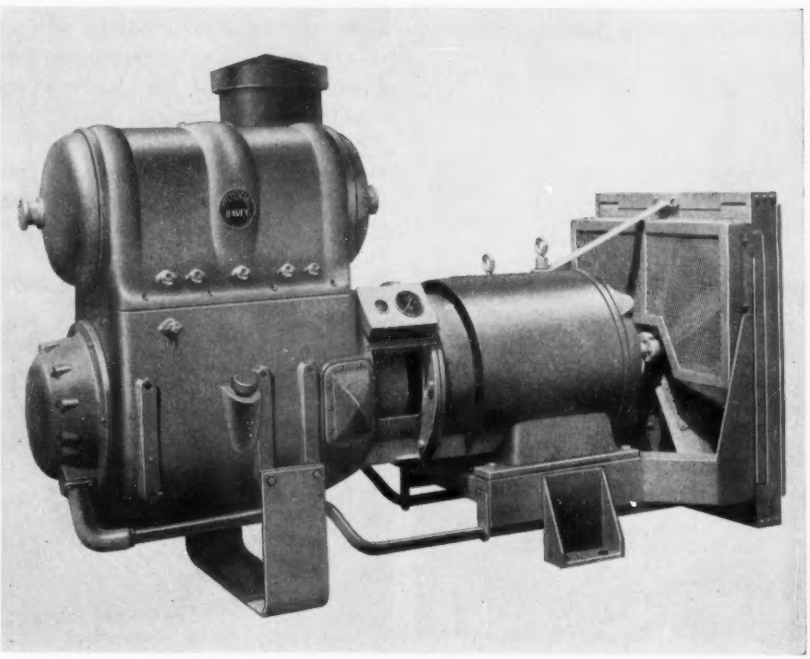
Oil-cooled rotary compressors can be operated practically anywhere 100 p. s. i. air is required. Their versatility is unlimited.

They can be used in portable or stationary mountings, located on drill rigs, trucks or tractors. Also, they can be direct or belt-connected to every conceivable type of power unit—electric motors, steam turbines, gasoline, diesel or propane engines.

And—finally, units are manufactured in both water and air-cooled types. The latter, utilizing air-cooled oil coolers, instead of water jackets, are especially advantageous where water is unavailable or prohibitively expensive. They are perfectly adapted to underground mining.



125 h.p. water-cooled rotary stationary compressor.



125 h.p. air-cooled rotary stationary compressor.

● "Today you have a wide selection of brand-name parts to choose from that will work in your engine . . . These parts will work and make profit for you or they couldn't stay on the market. The big question is **just how much profit** will such parts give you . . . mediocre or full measure?"

The above quote is from the introduction to a new booklet, THE INSIDE STORY, just released by Caterpillar Tractor Co. The book points up some of the differences, both large and small, which mean longer life and greater production for engines when original manufacturers' replacement parts are used.

"There **are** differences in the other brands offered as replacement parts," the booklet explains. "The main differences are initial cost and in the **little things** usually missing. The inside story is whether the **slightly** lower cost and missing features actually add to your profit picture or hold it to a bare minimum.

"You must evaluate these **little things** when making parts purchasing decisions. Here at Caterpillar, we concentrate on making engine parts **only** for Caterpillar Engines. It's our business to make parts for our **products.**

"Other manufacturers who make parts that will work in several brands of engines have research and engineering facilities. They use good materials . . . . with precision workmanship. But they cannot feasibly devote **as much** time and concentrated effort in designing and building their parts to fit specific models as the original equipment manufacturer.

"They can duplicate to a degree . . . certainly. But it's impossible to add the **'little extras'** that mean big differences in operating efficiency and profit from your engine.

"Such duplication will work, but sometimes at a price of sacrificed efficiency. And this efficiency is critical."

The booklet offers specific examples of the "little things" which have been found important in the company's experience of building Caterpillar Engines. These include:

" . . . an ill-fitting piston can pound an engine with forces comparable to blows from a sledge hammer. A piston that is **slightly** wrong in size, shape or weight disturbs the balance, making your engine run rough . . . robbing you of valuable horsepower."

Still other "little" things which are **big** factors in performance include the **exact** shape of the pistons. "Our pistons are scientifically designed so combustion loads and heat inside the cylinders cause the **exact** amount of expansion of the piston for perfect operating shape," the booklet continues.

A gradual taper towards the crown of the piston is an "extra" designed into every Cat-built piston. At operating temperature, the piston sides become straight, holding the rings precisely parallel to the liner wall.

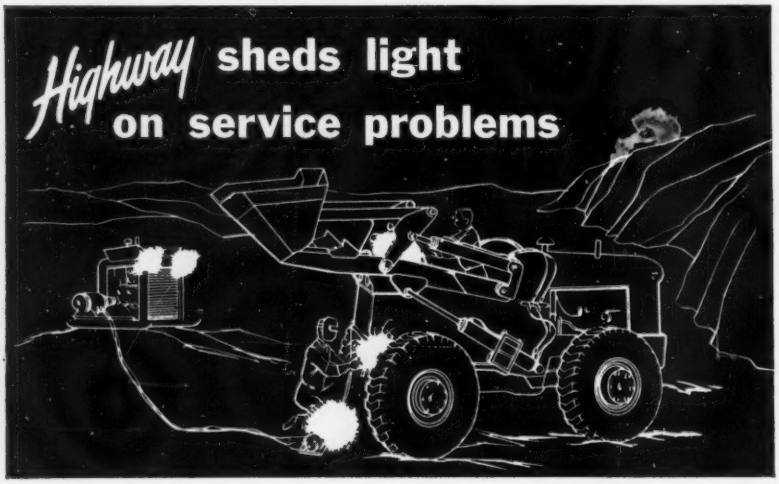
"Our pistons aren't round! At least at room temperature they aren't. Rather, we've found that an eliptically shaped piston becomes a true circular shape under compression and heat," the booklet states.

The differences in shapes of Cat piston ring replacements and those of other manufacturers, plus the design of the integrally cast iron ring band in Cat pistons also come in for discussion.

Copies of THE INSIDE STORY may be obtained at Caterpillar dealerships or by writing to the Advertising Division, Caterpillar Tractor Co., Peoria, Illinois, and requesting Booklet No. DE040.

"The Inside Story," just released by Caterpillar Tractor Co., describes the "little" replacement parts differences which add up to full or mediocre profit potenial from your diesel engine. Shape, size and design of original manufacturers' parts, the book points out, have a definite bearing on the life and productivity of an engine.

Ready to go back to work in a new application, the reassembled transmission was installed in a different D9 by servicemen of Beckwith Machinery Co., Caterpillar dealer in western Pennsylvania. Owned by D. C. Penoyer of Clearfield, Pa., the tractor is shown here ripping overburden in coal stripping operations. This D9's original transmission, with 2,048 hours of service, was returned to the factory for inspection. Simplified by unit construction of the transmission, the exchange was made in eight hours.



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ANNUAL MEETING OF THE CENTRAL PENNSYLVANIA COAL OPERATORS ASSOCIATION

(Continued from Page 9)

At the banquet in the evening Hon. Royce A. Hardy, Assistant Secretary of the Interior (Mineral Resources), Washington, D. C., was the guest speaker. Approximately 200 persons attended the banquet. Mr. Hardy reviewed activities of the Department of Interior as they affect the Coal Industry. He commented particularly on the new office of Coal Research to be established in that Department, and on the oil import program that is under his jurisdiction. He thanked the members of the Association for their cooperation in filing information with the Bureau of Mines, and noted the fine safety record of the area.

Directors elected by the Associations for a one-year term are as follows:

The Central Pennsylvania Coal Producers' Association:

T. L. Aitken, Pennsylvania Coal & Coke Div. of Fairbanks Whitney Corp., Cresson.

Charles B. Baton, Carpentertown Coal & Coke Co., Pittsburgh.

Otes Bennett, Conemaugh Mining Co., Seward.

Heath S. Clark, Rochester & Pittsburgh Coal Co., Indiana.

A. B. Crichton. Jr., Crichton Coal & Coke Co., Johnstown.

Clarence A. Dobson, Allegheny River Mining Co., Kittanning.

John Emerick, Jr., Cambria Clearfield Mining Co., St. Benedict.

H. John Harper, Eastern Gas & Fuel Associates, Coal Division, Pittsburgh.

Donald E. Hartman, Penna. Coal & Coke Div. of Fairbanks Whitney Corp., Cresson.

John W. Krous, Imperial Coal Corp., Johnstown.

John K. McCarthy, The Morrisdale Coal Mining Co., Morrisdale.

W. J. B. Mayo, Eastern Gas & Fuel Associates, Coal Division, Melcroft.

Ralph E. Moore, Rich Hill Coal Mining Corp., Cresson.

Harold K. Powell, Powell Coal Co., Kittanning.

Robert H. Seese, The Berwind-White Coal Mining Co., Windber.

Joseph E. Smith, Wyatt Seanor Coal Co., Saltsburg.

J. D. Sutton, Clearfield Bituminous Coal Corp., Indiana.

R. T. Todhunter, Jr., Barnes & Tucker Co., Barnesboro.

Whitney Warner, Jr., Sterling Coal Co., Haverford.

John S. Todhunter, Barnes & Tucker Co., Barnesboro.

Eastern Bituminous Coal Association:

Charles G. Berwind, Jr., The Berwind White Coal Mining Co., Philadelphia.

Heath S. Clark, Rochester & Pittsburgh Coal Co., Indiana.

Matthew A. Crawford, Allegheny River Mining Co., Kittanning.

A. R. Davidson, Maple Hill Coal Co., Clearfield.

Sam Light, Coal Mining Company of Graceton, Inc., Punxsutawney.

John Barnes Mull, Barnes & Tucker Co., Haverford.

George E. Owen, Imperial Coal Corp., New York City.

Robert H. Seese, The Berwind-White Coal Mining Co., Windber.

R. T. Todhunter, Jr., Barnes & Tucker Co., Barnesboro.

R. S. Walker, Bradford Coal Co., Bigler.

Whitney Warner, Jr., Sterling Coal Co., Haverford.

R. W. Wigton, The Morrisdale Coal Mining Co., Philadelphia.

Harold D. Woolridge, Woolridge Coal Co., Clearfield.

● A new coal loading machine with a unique reverse link, double-arm gathering design has been introduced by Long-Airdox Company, Oak Hill, W. Va.

Identified as the 188-3, this loading machine is designed for heights 23½ in. and up and for all seam conditions. Capacity of the new machine is rated to 12 tpm.

Efficient loading is achieved by shorter, faster, more powerful arm strokes, with 30 per cent more torque per stroke. This results in higher capacity and better penetration than most conventional loaders.

In this design, the main arm digs and the small, auxiliary arm gathers material more positively and higher into the conveyor. Reverse link motion eliminates "slap" and quick reversal of the arms when over the conveyor. Arms reverse smoothly with minimum scattering of material.

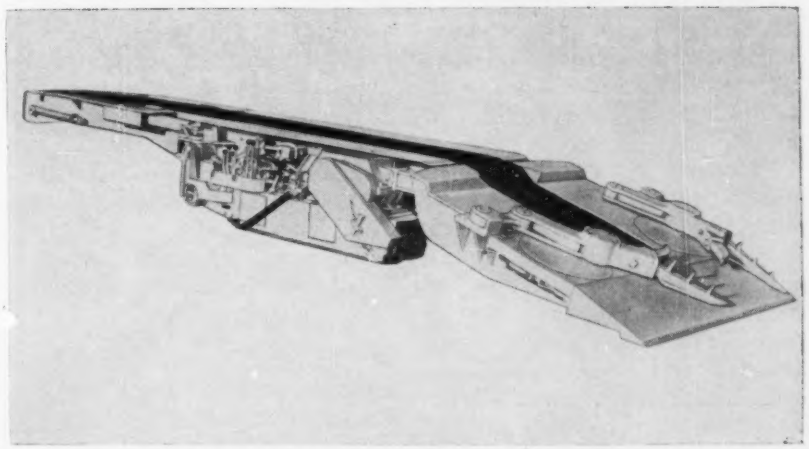
There are no separate electric drives or complicated controls in the new design. The loader operates by cushioned hydraulic clutch actuation from fingertip controls that provide smooth, lunge-free starts and trouble-free tram operation. Simple, single reduction, reverse gear transmissions mounted on each crawler give the loader the added maneuverability of independent crawler control. Longer crawler wheel base gives the 188-3 loader lower ground pressure and extra stability.

The gear train connects full

(Continued on Page 25)

GENERAL SPECIFICATIONS
Long-Airdox 188-3 Loading Machines

	188-3A	188-3B	188-3C
Height	23¾ in.	25¾ in.-26¾ in.	29¾ in.
Width	6 ft. 6 in.	6 ft. 6 in.	6 ft. 6 in.
Length	20 ft. 6 in.	20 ft. 10 in.	23 ft. 9 in.
Rated Capacity:			
44 Arm Beats	4 TPM	6 TPM	8 TPM
55 Arm Beats	6 TPM	8 TPM	10 TPM
66 Arm Beats	8 TPM	10 TPM	12 TPM
Motor Horsepower			
AC	80	80	80
DC	40	40	40
Weight	19,000 lbs.	18,500 lbs.	19,500 lbs.



188-3 Loading Machine. Long-Airdox Co. Oak Hill, W. Va.

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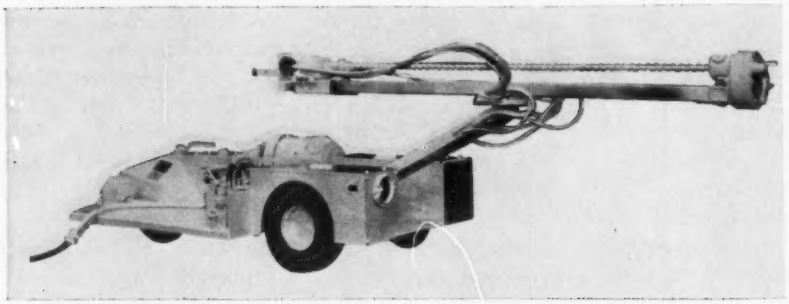
WIRE ROPE · SLINGS · WIRE ROPE ASSEMBLIES

NORTHEASTERN INCORPORATED
321 Cherry Avenue N. E. GL 6-7333 Canton, Ohio
75 Maysville Avenue GL 2-3602 Zanesville, Ohio



TDF-10 Mobile Coal Drilling Machine, Long-Airdox Co., Oak Hill, W. Va.

● Advantages of mobile coal drilling for coal seams as low as 28 inches are provided by the TDF-10 Mobile Coal Drilling Machine introduced by Long-Airdox Co., Oak Hill, W. Va.

This new machine features a new drilling concept known as "Rotary Thrust" where thrust is applied to the auger within one foot of the working face. The combination of thrust and ball bearing guides in the "Rotary Thrust" drill head permits faster, super drilling and eliminates problems encountered when drilling thrust is applied at the auger shank.

Extensive field service trials show that the TDF-10 can reduce mining costs since one man normally is able to perform both drilling and shooting operations. This savings in production costs results from the machine's ability to drill holes nine feet deep in 12 to 15 seconds. Shooting and loadability is improved since the machine can drill holes parallel to the roof and only 2½ inches from it. An advantage to thin seam mine operators is that the TDF-10 can drill over dust piles that remain after cutting.

The machine's mobility and high speed drilling features will enable more thin seam mine operators to realize the advantages of multiple Airdox shooting techniques. In this system, a development of Long-Airdox Co., a series of reusable tubes are inserted in drilled holes shot in sequence. Coal broken by this non-explosive method is easier to load and clean.

Variable drilling speeds are provided for all types of material, with the operator controlling the auger feed rate of 0 to 33 fpm by a foot throttle.

The TDF-10 is a two-wheel drive, manually steered machine. Its narrow width of 55¾ inches permits considerable maneuverability in confined working places. Each driven wheel of the machine is powered separately by a hydraulic motor operating through a speed reducer. Tramming speed is 0 to 150 fpm.

Functions of tramming, boom lift, and drilling are hydraulically powered, with steering being a manual operation for maximum simplicity. Fingertip controls are provided for all hydraulically powered functions.

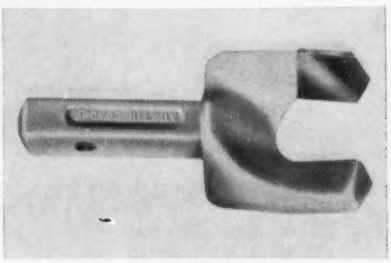
The TDF-10 has a vertical drilling range from 18 inches to five feet.

Additional information is available by writing Long-Airdox., Box 331, Oak Hill, W. Va.

● Two new rotary drill bits are announced by Austin Powder Company, Cleveland 13, Ohio.

Known as Austin D and DV Styles, they are made with oversized carbides multibonded in special alloy steel shanks. This combination is reputed to provide full cutting faces while protecting bits from wear and damage.

D Style is recommended for all general drill work. It may be reground more frequently than ordinary bits. DV Style, because of its "V" design, offers fastest penetration rate with least pressure in noncoring coal.



Austin D Style Rotary Drill Bit

Both Styles are available in 1¾", 1⅞" and 2" hole diameter sizes. For additional information, write Austin Powder Company, Cleveland 13, Ohio.

● Paul C. Manley has been appointed vice president and general manager for Long-Airdox Company, Oak Hill, West Virginia and Chicago, Illinois; manufacturers of mining equipment and air shooting systems. The announcement was made by J. B. Long, president.

In his new capacity, Mr. Manley will supervise overall operations of the company and coordinate the manufacturing activities of Long-Airdox plants in West Virginia, Pennsylvania, Iowa, and Illinois.

Paul C. Manley

Associated with the mining industry for more than 25 years, he was named a vice president in March, 1960 when Airdox Cardox Products Company merged with The Long Company to form the Long-Airdox Company.

Prior to the merger, Mr. Manley served in various managerial capacities with Airdox Cardox. His career was interrupted by military service during World War II in which he served as an infantry major in the U. S. Army.

(Continued from Page 23)

motor horsepower to gathering and conveying operations. Torque limitation is provided in the large area main drive (slip) clutch. This is an important design difference when compared with multi-motor loaders. Because the main drive clutch has a larger surface area and operates in a larger circulating oil bath, it can withstand heavy going while maintaining pre-selected slip rating without relaxing or galling.

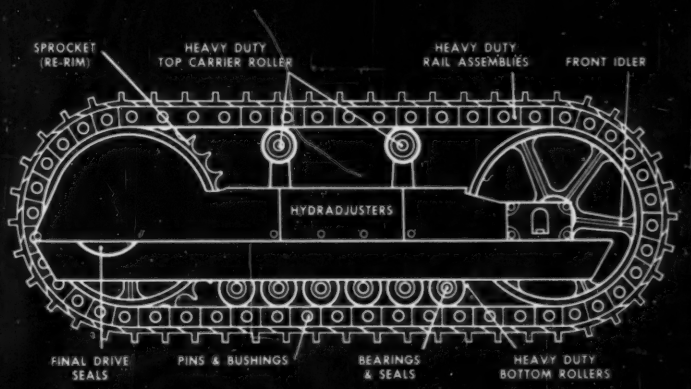
The head angle of the loader is a flat 15 degrees, which is less than other loaders since separate head motors are not used. The flatter head angle allows the arms to penetrate better and undercut coal more efficiently. Different from other designs, its head is hinged low at approximately the centerline of the crawlers. This results in more solid digging and allows the head to be raised as much as 19-in. The head depresses hydraulically giving the loader an exclusive ability to lift itself from the crawlers. It is the only loader engineered to handle bridge conveyors up to 40 ft. in length, thus is equally adaptable to continuous haulage or shuttle car loading.

Designed with a single motor to operate at 80 HP A.C. or 40 HP D.C., the new loader offers important savings in maintenance and spare parts inventory. Requiring fewer heavy gears and bearings, it is designed for unit maintenance. Units with parts kits are available for purchase or exchange.

According to Long-Airdox, the new loader is more economical in first cost, operation, and maintenance than other high capacity machines because of its simplified design features. Three different models of the 188-3 Loaders are available. Information can be obtained by writing Long-Airdox Company, Box 331, Oak Hill, W. Va.

INTERNATIONAL TD-25 crawler, owned by Mays Coal Company, of Clarion, Pa., levels spoil pile three miles south of Knox, where the company is working a bituminous stripping job. Spoil pile is reduced to tillable grade for farming or forestation. The TD-25 strips up to 38 feet of earth and shale overburden to uncover 24 to 42-inch Lower Kittanning Seam.

QUALITY REPLACEMENT PARTS IN STOCK FOR "CAT," "AC," "IHC"



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3—Joy 14BU Loaders, low pedestal, 7AE, 1956 & 57.
6—Joy 14BU Loaders, medium pedestal, 7RBE.
1—Joy 14BU 7CE High pedestal loader.
4—Joy 14BU 3PE Loaders.
2—Joy 12BU Joy Loaders complete with Piggybacks.
2—Joy 12BU Loaders, 9E latest type 250 V. DC.
5—Joy 12BU Loaders, 9E latest type 250 V. DC.
1—Joy 20BU Loader, latest type.
4—Joy 11BU Loaders, latest type.
1—Joy 8BU Loader, 34" overall height.
2—Joy 8BU Loaders, 220 V. AC.
1—Joy curved Bar Head for 14BU. complete.
6—Reliance 24-J Motors, 7½ H.P.
4—Reliance 38-J Motors, 10 H.P.
20—9-J Motors, 4 H.P.
2—Goodman 660 Loaders on Crawlers, 440 V. AC. like new.
1—Goodman 665 Loader on Crawlers, latest type 250 V. DC.
1—Goodman 865 Loader, 26" hi. Rebuilt. 250 V. DC.
1—Goodman 660 Loader on Crawlers, excellent 250 V. DC.
4—Joy 8SC Shuttle Cars. rebuilt.
4—Joy 6SC Shuttle Cars, rebuilt, latest type
1—Joy 5SC Shuttle Car, Excellent.
2—Joy 32E9 Shuttle Cars.
2—Joy 32E10 Shuttle Cars, rebuilt.
6—Joy 32E15 Shuttle Cars, rebuilt.
4—Joy 32E16 Shuttle Cars, rebuilt.
10—Joy 42E16 Shuttle Cars, rebuilt.
1—Joy CD-22 Drills, on rubber, like new.
6—Joy T-2-5 low pan Crawler Trucks, rebuilt.
1—Joy T-2-6 low pan Crawler Truck with reel.
2—Joy T-1, Standard Crawler Trucks, 220 AC.
1—Joy T-1 Standard Crawler Truck, 250 DC.
4—Joy 11-B Cutting Mach., like new, 35 & 50 HP.
1—Joy 7-B Cutting Mach., like new, 250 V. DC.
2—Goodman 212 Cutting Machines, 19" high.
1—Goodman 312 Cutting Machine, 17" high.
3—Goodman 412 Cutting Machines, 19" high.
1—Goodman Machine on Crawler, 31" high. All hydraulic.
6—Goodman 512 Machines with Bugdusters.
6—Goodman 612 Cutting Machines, 250 & 500 volt.
1—Jeffrey 70 URB rubber tired Cutter. Universal head, perfect condition.
1—Goodman 2410 Rubber Tired Cutter, Universal head, like new.
3—Joy 11RU Rubber Tired Cutters, with bugdusters. Universal heads, dual tires, like new. 250 V. DC.
2—Joy 10RU Rubber Tired Cutters, Universal head, 220/440 V. A.C. Perfect.
4—Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C.
6—7AU's on track, Universal head.
2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on Crawlers, 250 volt D.C.
1—Jeffrey 29LC on Crawlers, rebuilt.

LOCOMOTIVES

1—Goodman 6 ton, 93-A, 27" high, armor plate frame.
1—Jeffrey 15 ton MH-77 locomotive, armor plate frame.
3—Jeffrey, 13 ton, type MH-110, 36",42",44" ga.
2—Jeffrey 10 ton. type MH-110, 42" and 44" ga.
2—Jeffrey, 10 ton, type MH-78, 42" and 44" ga.
2—Goodman 8-30 and 10-30 Locos., 26" above rail.
1—Jeffrey MH-121, 4 ton, like new, with reel, 24" overall height.
2—Jeffrey MH-150, 6 ton, 26" overall height, rebuilt, with reel.
12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" ga.
4—Jeffrey, 8 ton, type MH-100 2½" armor plate frames.
1—Jeffrey, 6 ton, type 2186. 22" above rail.
3—Jeffrey, 4 ton, type MH-96, 42", 44", 48" ga.
1—G.E., 4 ton, type 825 Locomotive, 22" high.
10—G.E., 6 ton, types 801, 803, 821 Locomotives. 42", 44" and 48" ga
1—G.E., 8 ton, type 822 Locomotive, 44" ga.
3—G.E., 10 ton, type 809 Locomotives, 42", 44" and 48" ga.
2—G. E. 13 ton, type 829 Locomotives, armor plate frames.
1—Goodman 91A Locomotive, 8 ton, 26" overall height.
2—Goodman, type 33, 6 ton, 44" and 48" ga.
3—Westinghouse type 902, 4 ton, 42" and 48" ga.
2—Atlas Battery Locomotives, 36" ga.
1—Atlas Trolley Locomotive, 4 ton, 24" high.
1—Ironton Battery Locomotive, 4 ton, 24" high, excellent, with charger.
2—Westinghouse, type 904, 6 ton, 44" and 48" ga.
2—Westinghouse, type 906, 44" and 48" ga.
2—Westinghouse, type 907, 10 ton, 44" and 48" ga.
8—Jeffrey MH-78 Locomotive Units, cheap.
4—Jeffrey MH-88 Locomotive Units, real bargains.
6—Jeffrey MH-100 Locomotive Units, resonable.
3—Plymouth Diesel Locomotives, 8 and 10 tons, 42" and 44" ga.
Locomotive Trucks & Spare Armatures for the above.

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1—All Steel 5 Track Tipple, new 1957, complete with washer, silo, oil treating system, all bolted construction.
1—Complete Five Track Tipple with Washers and Air Tables.
1—Complete stoker plant, all steel.
2—Complete Tipples, 3 & 5 track, steel and wood.
3—Cleaning Plants, 1 ea. McNally, Roberts and Schaefer, Jeffrey Washers and Air-Flo Tables.
4—Complete Aerial Trams for coal or refuse.
3—Complete Rope and Button Lines.
2—Monitor Lines complete with Drums, excel.
1—Allis-Chalmers 5 x 12 Rippflo Vibrator.
1—Allis-Chalmers 4 x 12 Low-Head Vibrator.
1—Robins Gyrex Vibrator, 4 x 10.
10—Belt and Apron type Loading Booms.
6—Shaker Screens.
1—Robins Car Shakeout.
20—Crushers, various sizes—Jeffrey, McLanahan & McNally.
4—Mine Scales, 10 & 20 ton.
5—Truck Scales, 25 to 40 ton, late type.
Feeders, Belt and Drag Conveyors, Car Retarders.

CUTTING MACHINES

2—Joy 10RU Rubber Tired Cutters, Universal head, 220/440 volt A.C. Perfect.
4—Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C.
3—Joy 11RU Rubber Tired Cutters, 250 V. D.C.
1—Goodman 2410 Rubber Tired Cutter. Universal head, new 1956. Excellent.
2—Jeffrey 29UC Universal Machines on Crawlers
1—Goodman on Crawlers, 31" overall height.
3—Baby Goodman 212's, rebuilt. 250 V. D. C.
7—Goodman 212 Cutting Machines, 19" high.
4—Goodman 312 Cutting Machines, 17" high.
3—Goodman 412 Cutting Machines, 19" high.
6—Goodman 512's with Bugdusters, like new.
4—Goodman 512's, rebuilt, or as removed from service.
6—Goodman 612,s—250 & 500 Volt A. C.
3—Goodman 112's, 220/440 Volt A. C.
1—Joy 7-B Cutting Machine, 250 Volt D. C.
4—Joy 11B Cutting Machines, rebuilt, 35 & 50 H. P.
6—7AU's, on track, Universal head.
10—Goodman 12AA's and 112AA's, 220 V. D. C.
2—Goodman 324 Slabbers.
2—Goodman 724 Slabbers.
2—Goodman 824 Slabbers.
6—Jeffrey 35L's, like new, 250 V. D. C. 17" high.
2—Jeffrey 35L's, on low vein trucks.
2—Jeffrey 35L's, 220/440 A. C.
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2—Jeffrey 29B's on track.
10—Jeffrey 29C's track mounted.
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1—Sullivan CE7, 220/440 V. A. C.

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2—Jeffrey 52-B tandem drive 30" Belt Conveyors 1,500'.
1—Jeffrey 52-B tandem drive 36" Belt Conveyor.
1—Joy 30" Underground Belt Conveyor. Excell.
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1—Goodman 97-C, 26" Conveyor. 1,000 long.
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3,000' Conveyor Belt, 30".
4,000' Conveyor Belt, 26".
8—Jeffrey 61AM 12" Chain Conveyors, 300'.
2—61EW Elevating Conveyors.
2—61WH 15" Room Conveyors, 300'.
2—Joy 15" Room Conveyors, 300'.
2—Joy 20" Conveyors, 300'.
4—Joy Ladel UN-17 Shakers.
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2—200KW G. E. HCC-6's, Rotary Convertors, 275 V. D. C. Steel frames, Newly rewound.
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2—500KW. West. Rotary Converters, 275 V. D.C. Perfect.
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2—300KW G.E. MG Sets, like new.
1—300KW West. 600 volt MG Set, rebuilt.
2—300KW Westinghouse, 600 volt, 6 phase. Rotary Converters.
2—500KW Westinghouse, 600 volt, D.C., 6 phase, Rotary Converters.
2—500KW HCC-6's, Rotary Converters, 6 phase, 600 V. D.C.
1—GMC-471 Diesel with 60KW, 250 V. D.C. Gen.
2—GMC-671 Diesels with 75KW, 250 V. D.C. Gen.
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5—Joy 12BU9E Loaders, 220/440 V. A.C. Excellent.
3—Joy 12BU9E Loaders, latest type.
2—Joy 12BU with Piggyback Conveyors.
2—Goodman 865 Loaders, 26", on crawlers.
1—Goodman 665 Loader, on Crawlers, rebuilt.
2—Goodman 660 Loaders, 440 V. A. C. perfect.
1—Goodman 660 Loader, on Crawlers, 250 V. DC.
1—Goodman 460, on track, rebuilt, all hydraulic.
2—Jeffrey 61 CLR's on rubber, 26".
3—Jeffrey L-500 Loaders.
2—Myers Whaley, No. 3 Automatic Loaders.
2—Clarkson Loaders, 26" above rail.

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5323 Marion 18 yd. Elec. Shovel
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151-M Marion 7 yd. Elec. Shovel
1600 P & H 6 Yd. Elec. Shovels
170-B B.E. 6 yd. Elec. Shovel
4161 Marion 6 yd. Elec. Shovel
2400 Lima 6 yd. Std. & H. L. Shovels
120-B B.E. & 4121 Marion 4 yd. Elec. Shovels
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1055 P & H 3 yd. H. L. Shovel
1201 Lima 3½ Yd. Standard Shovel
111-M Marion Standard & H. L. Shovels
3500 Manitowoc Standard & H. L. Shovels
54-B Bucyrus-Erie Standard & H. L. Shovels
Model T-650 REICHdrill, Truck Mounted Rotary and Down-The-Hole
Ingersoll-Rand Truck Mtd. & Crawler Mtd. Drillmasters
Keystone No. 50 Truck Mtd. Stardrill
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Frank Swabb Equipment Co., Inc.
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Nothing fits **STRIP MINING**
like this fast, mobile 6-yd. *diesel-powered*
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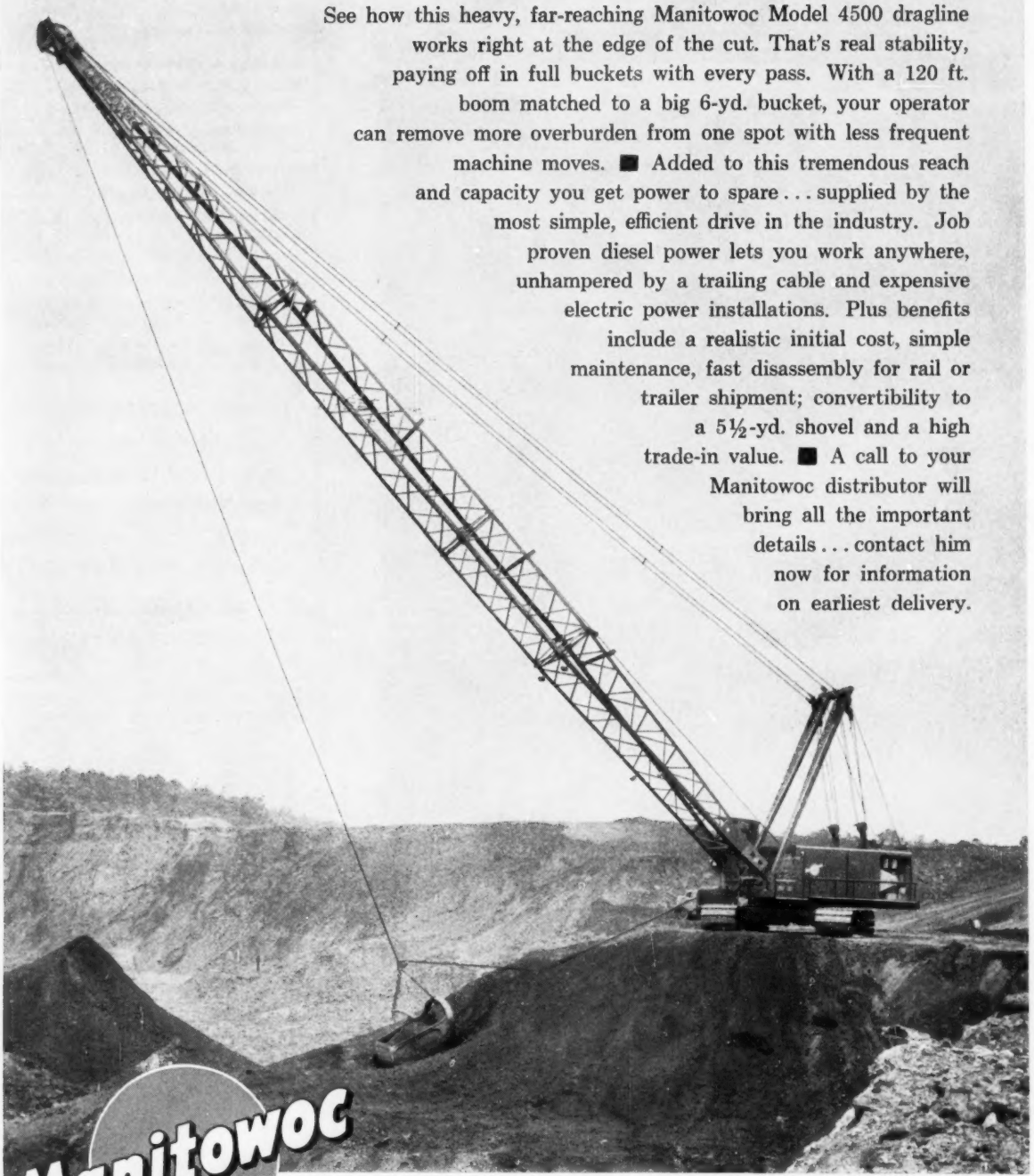

See how this heavy, far-reaching Manitowoc Model 4500 dragline works right at the edge of the cut. That's real stability, paying off in full buckets with every pass. With a 120 ft. boom matched to a big 6-yd. bucket, your operator can remove more overburden from one spot with less frequent machine moves. ■ Added to this tremendous reach and capacity you get power to spare . . . supplied by the most simple, efficient drive in the industry. Job proven diesel power lets you work anywhere, unhampered by a trailing cable and expensive electric power installations. Plus benefits include a realistic initial cost, simple maintenance, fast disassembly for rail or trailer shipment; convertibility to a 5½-yd. shovel and a high trade-in value. ■ A call to your Manitowoc distributor will bring all the important details . . . contact him now for information on earliest delivery.

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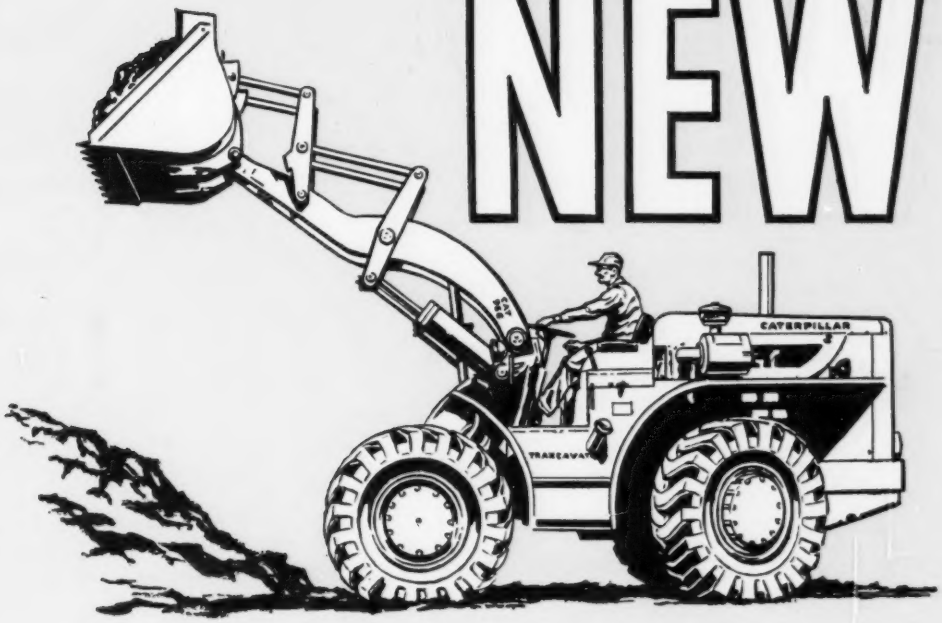

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BIG 966

Top producer of the Cat wheel loaders ... the 140 HP, 2¾ yd. 966 Traxcavator. The big production machine with the best features *plus* dependability.

- **Control** with fast, easy Cat power shift transmission, automatic bucket positioners.
- **Speed** from 140 HP turbocharged Cat Diesel Engine and *live action* hydraulics.
- **Stability** in design with almost 5 feet dumping reach.
- **Safety** with open, easy-access cockpit — all bucket arms are out front.

Check this Machine for Loading or Cleaning Coal in your Operation.

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"Our Allis-Chalmers HD-21 does everything better!"

. . . Arthur Rydberg, River Hill Coal Co.

Arthur Rydberg
River Hill Coal Co.

River Hill Coal Co., Kylertown, started buying Allis-Chalmers equipment back in the days of the first HD-10s.

"Today's HD-21s are the best tractors we have ever operated," says Arthur Rydberg, River Hill partner. "They do every job better, faster and at less cost to us . . .

"We make big labor and money savings because it's not necessary to grease rollers. Double reduction final drives are dependable and trouble free. And, Highway's Du Bois branch service cuts down-time to a new low . . . "

Allis-Chalmers HD-21 backfilling at River Hill Coal Co. Tractor also clears woods and brush. . . . cuts down top 10 ft. of overburden. Latter runs about 40 ft. in area where photo was taken.

A-2946A

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